REMARKS

This is in full and timely response to the Office Action mailed on January 9, 2006. Reexamination in light of the following remarks is respectfully requested.

Claims 19-48 are currently pending in this application, with claims 19 ,31, 33, and 41 being independent.

No new matter has been added.

Entry of amendment

This amendment prima facie places the case in condition for allowance. Alternatively, it places this case in better condition for appeal.

Accordingly, entry of this amendment is respectfully requested.

Prematureness

Applicant, seeking review of the *prematureness* of the final rejection within the Final Office action, respectfully requests reconsideration of the finality of the Office action for the reasons set forth hereinbelow. See M.P.E.P. §706.07(c).

Claim rejections

Paragraphs 1-28 of the Office Action indicates a rejection of claims 19-51 under 35 U.S.C. §102 as allegedly being anticipated by U.S. Patent No. 5,911,619 to Uzoh et al. (Uzoh)

At least for the following reasons, if the allowance of the claims is not forthcoming at the very least and a new ground of rejection made, then a ***new non-final Office Action*** is respectfully requested.

Claims 19-24, 26-28 - Claims 20-30 are dependent upon claim 19. The rejection of claim 19 is traversed at least for the following reasons.

Claim 19 is drawn to a polishing apparatus comprising:

a polishing tool having a polishing surface and having conductivity;

a polishing tool rotating and holding means for rotating said polishing tool about a predetermined axis of rotation and holding the same;

a rotating and holding means for holding a polishing object and rotating the same about a predetermined axis of rotation;

a movement and positioning means for moving and positioning said polishing tool to a target position in a direction facing said polishing object;

a relative moving means for making the polished surface of said polishing object and the polishing surface of said polishing tool relatively move along a predetermined plane;

an electrolyte feeding means for feeding an electrolyte onto the polished surface of said polishing object; and

an electrolytic current supplying means for supplying an electrolytic current flowing through said polishing tool through said electrolyte from said polished surface by using the polished surface of said polishing object as an anode and said polishing tool as a cathode.

Uzoh arguably teaches a polishing pad 64, and a platen 62 and a rotatable shaft 68 (Uzoh at Figure 7).

Uzoh arguably teaches a rotatable workpiece carrier 66 for holding a wafer W (Uzoh at Figure 7).

Uzoh arguably teaches a container 70 coupled to a conduit 72 arranged and dimensioned for dispensing an electrolytic polishing slurry 74 onto the pad 64 during a normal operation of the apparatus 60 (Uzoh at Figure 7).

Uzoh arguably teaches a source 80 to vary the electrochemical current i (Uzoh at Figure 11a).

Claim 19 includes a movement and positioning means for moving and positioning said polishing tool to a target position in a direction facing said polishing object. The specification as originally filed teaches the presence of a Z-axis positioning mechanism 31 for positioning the polishing tool holder 11 to the target position in the Z-axial direction (Specification at page 17, lines 11-14). The Z-axis positioning mechanism 31 corresponds to a concrete example of the movement and positioning means of the present invention (Specification at page 17, lines 22-25).

However, Uzoh *fails* to disclose, teach or suggest a movement and positioning means for moving and positioning the polishing pad 64 to a target position in a direction facing the wafer W.

Claim 19 includes a relative moving means for making the polished surface of said polishing object and the polishing surface of said polishing tool relatively move along a predetermined plane.

The specification as originally filed teaches that the X-axis movement mechanism 41 corresponds to a concrete example of the rotating and holding means and the relative moving means of the present invention (Specification at page 17, lines 19-22). The X-axis movement mechanism 41 has a wafer table 42 for chucking the wafer W, a holder 45 for rotatably holding the wafer table 42, a drive motor 44 for supplying a drive force for rotating the wafer table 42, a belt 46 for connecting the drive motor 44 and the rotation shaft of the holder 45, a polishing pan 47 provided in the holder 45, an X-axis slider 48 at which the drive motor 44 and the holder 45 are disposed, an X-axis servo motor 49 mounted on a not illustrated base, a ball screw shaft 49a connected to the X-axis servo motor 49, and a moveable member 49b connected to the X-axis slider 48 and with a screw portion screwed into the ball screw shaft 49a formed therein (Specification at page 18, line 23 to page 19, line 10). The X-axis servo motor 49 is driven to rotate by the drive current supplied from an X-axis driver 54 connected to the X-axis servo motor 49 (Specification at page 19, lines 19-21). The X-axis slider 48 moves in the X-axial direction via the ball screw shaft 49a and the moveable member 49b (Specification at page 19,

lines 21-23). At this time, by controlling the drive current supplied to the X-axis servo motor 49, the control of the speed of the wafer table 42 in the X-axial direction becomes possible (Specification at page 19, line 23 to page 20, line 1).

However, Uzoh also *fails* to disclose, teach or suggest a relative moving means for making the polished surface of the wafer W and the polishing surface of the polishing pad 64 relatively move along a predetermined plane.

Claim 25- The rejection of claim 25 is traversed at least for the reasons provided hereinabove with respect to claim 19, and for the following reasons.

Within claim 25, said scrub member is formed from a material which absorbs the electrolyte and the chemical polishing agent including the polishing abrasive and able to supply a current and supplies the electrolyte and/or chemical polishing agent supplied from said electrode plate side to the polished surface of said polished object.

The specification as originally filed provides that the scrub member 24 adhered to the bottom surface of the electrode plate 23 is formed by a material capable of absorbing the electrolyte and the slurry and passing them from the upper surface to the lower surface (Specification at page 24, line 25 to page 25, line 3).

The Final Office Action contends that Uzoh teaches element 66 as being a scrub member (Final Office Action at page 3).

While Uzoh arguably teaches the presence of a workpiece carrier 66, Uzoh fails to disclose, teach or suggest workpiece carrier 66 as being formed from a material which absorbs the electrolyte and the chemical polishing agent including the polishing abrasive and able to supply a current and supplies the electrolyte and/or chemical polishing agent supplied from the electrode plate side to the polished surface of the polished object.

Claim 29- The rejection of claim 29 is traversed at least for the reasons provided hereinabove with respect to claim 19, and for the following reasons.

Claim 29 includes a resistance value detecting means for detecting an electrical resistance between said electrode plate and said polishing tool through the polished surface of said polished object.

The specification as originally filed teaches that the electrolytic power supply 61 is provided with a resistance meter 63 as a resistance value detecting means of the present invention (Specification at page 30, lines 12-14).

However, a resistance meter is absent from within Uzoh.

Claim 30- The rejection of claim 30 is traversed at least for the reasons provided hereinabove with respect to claim 29, and for the following reasons.

Claim 30 includes a control means for controlling a position of a facing direction of said polishing tool and said polished object so that the value of the electrolytic current becomes constant based on a detection signal of said current detecting means.

The specification as originally filed teaches that the controller 55 is able to control the operation of the polishing apparatus 1 based on these current value signal 62s and electric resistance value signal 63s (Specification at page 32, lines 9-12). Specifically, it controls the Z-axis servo motor 18 by using the current value signal 62s as a feedback signal so that the electrolytic current obtained from the current value signal 62s becomes constant or controls the operation of the polishing apparatus 1 so as to stop the polishing based on the current value or the electric resistance value specified by the current value signal 62s or the electric resistance value signal 63s (Specification at page 32, lines 12-20).

However, a control means is absent from within Uzoh.

Claims 31 and 32 - Claim 32 is dependent upon claim 31. The rejection of claim 31 is traversed at least for the following reasons.

Claim 31 is drawn to a polishing apparatus which comprises a polishing tool having a polishing surface which contacts the entire surface of the polished surface of the polishing object

while rotating and which brings said polishing object into contact with said polished surface while rotating it so as to flatten and polish the same, said polishing apparatus comprising:

an electrolyte feeding means for feeding an electrolyte onto said polishing surface,

an anode electrode and a cathode electrode capable of supplying electric power to the polished surface of said polishing object in said polishing surface, and

relative moving means for enabling the polished surface of said polishing object and the polishing surface of said polishing tool to move along a predetermined plane relative to each other,

said polishing apparatus flattening and polishing flattens and polishes the polished surface of said polishing object by electrolytic composite polishing which combines electrolytic polishing by said electrolyte and mechanical polishing by said polishing surface.

As noted hereinabove, Uzoh also *fails* to disclose, teach or suggest a relative moving means for enabling the polished surface of said polishing object and the polishing surface of said polishing tool to move along a predetermined plane relative to each other.

Claims 33-34, and 36-40 - Claims 34-40 are dependent upon claim 33. The rejection of claim 33 is traversed at least for the following reasons.

Claim 33 is drawn to a polishing method including the steps of:

pushing the polishing surface of a conductive polishing tool and the surface of the polishing object with a metal film formed on at least the surface or an inner layer against each other while interposing the electrolyte therebetween;

supplying the electrolytic current flowing from the surface of said polishing object to said polishing tool through said electrolyte by using said polishing tool as a cathode and the surface of said polishing object as an anode,

making said polishing tool and said polishing object move relatively along a predetermined plane while rotating the two; and

flattening the metal film formed on said polishing object by electrolytic composite polishing combining electrolytic polishing by the electrolyte and mechanical polishing by the polishing surface.

Claim 33 includes a step of making said polishing tool and said polishing object move relatively along a predetermined plane while rotating the two.

The specification as originally filed teaches that the X-axis movement mechanism 41 corresponds to a concrete example of the rotating and holding means and the relative moving means of the present invention (Specification at page 17, lines 19-22). The X-axis movement mechanism 41 has a wafer table 42 for chucking the wafer W, a holder 45 for rotatably holding the wafer table 42, a drive motor 44 for supplying a drive force for rotating the wafer table 42, a belt 46 for connecting the drive motor 44 and the rotation shaft of the holder 45, a polishing pan 47 provided in the holder 45, an X-axis slider 48 at which the drive motor 44 and the holder 45 are disposed, an X-axis servo motor 49 mounted on a not illustrated base, a ball screw shaft 49a connected to the X-axis servo motor 49, and a moveable member 49b connected to the X-axis slider 48 and with a screw portion screwed into the ball screw shaft 49a formed therein (Specification at page 18, line 23 to page 19, line 10). The X-axis servo motor 49 is driven to rotate by the drive current supplied from an X-axis driver 54 connected to the X-axis servo motor 49 (Specification at page 19, lines 19-21). The X-axis slider 48 moves in the X-axial direction via the ball screw shaft 49a and the moveable member 49b (Specification at page 19, lines 21-23). At this time, by controlling the drive current supplied to the X-axis servo motor 49, the control of the speed of the wafer table 42 in the X-axial direction becomes possible (Specification at page 19, line 23 to page 20, line 1).

Uzoh *fails* to disclose, teach or suggest a step of making said polishing tool and said polishing object move relatively along a predetermined plane while rotating the two.

Claim 35- The rejection of claim 35 is traversed at least for the reasons provided hereinabove with respect to claim 33, and for the following reasons.

Within claim 35, said polished object comprises a stack of a plurality of films comprised of different materials, and the current flowing from the surface of the polished object to the polishing tool through the electrolyte, changing in response to differences in the electrical characteristics of the materials of the films, is monitored and the progress in the polishing is managed based on the magnitude of the electrolytic current.

The specification as originally filed teaches that the controller 55 is able to control the operation of the polishing apparatus 1 based on these current value signal 62s and electric resistance value signal 63s (Specification at page 32, lines 9-12). Specifically, it controls the Z-axis servo motor 18 by using the current value signal 62s as a feedback signal so that the electrolytic current obtained from the current value signal 62s becomes constant or controls the operation of the polishing apparatus 1 so as to stop the polishing based on the current value or the electric resistance value specified by the current value signal 62s or the electric resistance value signal 63s (Specification at page 32, lines 12-20).

Uzoh arguably teaches that preferably, the source of potential 80 is electronic computer controlled--FIG. 13. FIG. 13, the source 80 includes or is connected to a controller having a CPU (eg, microprocessor), Memory, Buses, I/O ports, all suitably interconnected to signal receiver circuits 81 and to an endpoint detector arrangement, to control the current i according, eg, to the waveforms of FIG. 14 (Uzoh at column 5, lines 22-28). Software instructions and data can be coded and stored within the Memory, for causing the controller to generate suitable signals to the source 80 to control the current i. (Uzoh at column 5, lines 28-32).

Yet, Uzoh fails to disclose, teach or suggest that the current flowing from the surface of the wafer W to the pad 64 through the electrolyte, changing in response to differences in the electrical characteristics of the materials of the films, is monitored and the progress in the polishing is managed based on the magnitude of the electrolytic current.

Claim 39- The rejection of claim 35 is traversed at least for the reasons provided hereinabove with respect to claim 33, and for the following reasons.

Claim 39 includes the step of managing the progress of the polishing of the polished object based on the magnitude of the electrical resistance between said electrode member and said polishing tool through the surface of the polished object.

The specification as originally filed teaches that the electrolytic power supply 61 is provided with a resistance meter 63 as a resistance value detecting means of the present invention (Specification at page 30, lines 12-14).

However, a step of managing the progress of the polishing of the polished object based on the magnitude of the electrical resistance between said electrode member and said polishing tool through the surface of the polished object is absent from within Uzoh.

Claims 41-42, 44, 46, 48 - Claims 42-48 are dependent upon claim 41. The rejection of claim 41 is traversed at least for the following reasons.

Claim 41 is drawn to a polishing method including the steps of:

forming a passivation film exhibiting a function of preventing an electrolytic reaction of the metal film at the surface of the metal film formed on the polishing object;

pushing the polishing surface of a conductive polishing tool and a metal film against each together while interposing an electrolyte between the polishing surface and the metal film, and then applying a predetermined voltage between said polishing tool and said metal film;

making the polishing surface of said polishing tool and the metal film of said polishing object move relatively along a predetermined plane and selectively removing a passivation film on a projecting portion projected from the polishing surface of said polishing tool in said metal film by mechanical polishing by said polishing tool; and

removing a projecting portion of the metal film exposed at the surface due to the removal of said passivation film by the electrolytic polishing function by said electrolyte and flattening said metal film.

As noted hereinabove, Uzoh also *fails* to disclose, teach or suggest a step of making the polishing surface of said polishing tool and the metal film of said polishing object move relatively along a predetermined plane and selectively removing a passivation film on a projecting portion projected from the polishing surface of said polishing tool in said metal film by mechanical polishing by said polishing tool.

Claim 43- The rejection of claim 43 is traversed at least for the reasons provided hereinabove with respect to claim 41, and for the following reasons.

Within claim 43, said passivation film comprises of an oxide film formed by oxidizing the surface of said metal film.

Uzoh arguably teaches that the wafer includes, for example, a Si substrate 14 having an insulator 16 (eg, a SiO_2 layer), a conductor 18 (eg, a Cu layer) and a microelectronic component 20 (eg, a CMOS device) disposed thereon (Uzoh at column 1, lines 34-38).

However, Uzoh fails to disclose, teach or suggest insulator 16 as being a passivation layer.

Claim 45- The rejection of claim 45 is traversed at least for the reasons provided hereinabove with respect to claim 41, and for the following reasons.

Within claim 45, said passivation film is higher in electrical resistance and lower in mechanical strength compared with the metal film.

However, Uzoh fails to disclose, teach or suggest a passivation film that is higher in electrical resistance and lower in mechanical strength compared with the metal film.

Claim 47- The rejection of claim 47 is traversed at least for the reasons provided hereinabove with respect to claim 41, and for the following reasons.

Claim 47 includes the step of managing the progress of the polishing based on the magnitude of the electrical resistance between said electrode member and said polishing tool.

The specification as originally filed teaches that the electrolytic power supply 61 is provided with a resistance meter 63 as a resistance value detecting means of the present invention (Specification at page 30, lines 12-14).

However, a step of managing the progress of the polishing based on the magnitude of the electrical resistance between said electrode member and said polishing tool is absent from within Uzoh.

Withdrawal of this rejection and allowance of the claims is respectfully requested.

Conclusion

For the foregoing reasons, all the claims now pending in the present application are allowable, and the present application is in condition for allowance. Accordingly, favorable reexamination and reconsideration of the application in light of the amendments and remarks is courteously solicited.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone Brian K. Dutton, Reg. No. 47,255, at 202-955-8753 or the undersigned attorney at the below-listed number.

If any fee is required or any overpayment made, the Commissioner is hereby authorized to charge the fee or credit the overpayment to Deposit Account # 18-0013.

Dated: March 22, 2006

Respectfully submitted,

By_____ 47,255

Ronald P. Kananen
Registration No.: 24,104
RADER, FISHMAN & GRAUER PLLC
1233 20th Street, N.W.
Suite 501
Washington, DC 20036
(202) 955-3750
Attorney for Applicant